winds prevailed in the Missouri Valley. Moving slowly eastward during the 28th the center reached the region north of Lake Superior, and passed thence southeast to the lower lake region by the evening of the 29th.

On the 28th the 24-hour temperature rise was 10° to 20° in the Atlantic coast states; rain or snow fell from the lower lake region over New England; and high south to west winds prevailed over the Great Lakes. On the 29th the temperature rose 10° to 20° along the Atlantic coast and in the east Gulf states; rain or snow fell from the Lake region and Ohio Valley over the middle Atlantic and New England states; and brisk to high winds shifting to north and west prevailed over the Lakes. Moving southeast, the low area was central off the middle Atlantic coast the morning of the 30th, whence it moved slowly northeastward, and at the close of the month was central south of Newfoundland, with pressure below 29.50. During the last two days of the month destructive north to northeast gales prevailed along the New England coast; the winds were heavy along the coast to the Carolinas; and cooler, clearing weather extended over the coast line.

XII.—Appeared off the north Pacific coast and passed thence to Alberta during the 29th, with pressure below 29.40 at the evening report. The temperature rose 10° to 20° on the northeast slope of the Rocky Mountains, and rain fell on the north Pacific coast. The center moved to Manitoba during the 30th, with an increase of about .30 in pressure. The warmer condition extended to the Lake region, and the temperature fell 10° to 20° on the northeastern slope of the Rocky Mountains. No precipitation attended this low area east of the Rocky Mountains.

XIII.—During the 29th the weather was unsettled on the south Pacific coast and over the south part of the plateau region, and rain fell from southern California to western Texas. During the 30th the 12-hour decrease of pressure was .10 to .20 in that region, a decrease of .20 being noted at Keeler, Cal. At the evening report of the 30th a low pressure area was apparently central on the eastern slope of the Sierra Nevada Mountains south of the 40th parallel; rain fell from California over the middle and southern plateau regions, the rainfall being very heavy over parts of the southern plateau; and a wind velocity of 40 miles per hour from the west was noted at Tucson, Ariz. Advancing rapidly eastward the center reached northern Kansas the evening of the 31st, with pressure below 29.80. The 24-hour temperature fall at the morning report was more than 30° in southern Assiniboia, and this condition advanced to the middle-eastern slope of the Rocky Mountains by the evening report; rain or snow fell from the middle and southern plateau regions to the Lake region; and the wind reached a velocity of 40 miles per hour from the south at Amarillo, Tex.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.				Maximum pressure change in 12 hours, maximum temperature change in 24 hours, and maximum wind velocity.									
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.	Duration.	Velocity per hour.	Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	1	39	110	29	84	6.5	29	Swift Current, N. W. T	.50	5	Omaha, Nebr	30	6	Fort McKinney, Wyo	n.	42	5
II	1	52	104	49	87	2.0	17	Fort Smith, Ark	.60	1	White River, Ont	48	2	Chicago, Ill	nw.	42	3
III	8	51	110	49	66	2.5	44	Qu'Appelle, N. W. T	.38	7	do	26	9	Kitty Hawk, N. C	ne.	52	10
IV	11	40	100	40	110	2.0	21	Salt Lake City, Utah	.30	11	Cheyenne, Wyo	24	11	Montrose, Colo	e.	26	11
V	12	51	122	43	68	4.5	26	Sydney, C. B. I	.40	17	White River, Ont	38	14	Block Island, R. I	n.	36	17
VI	16	52	110	38	97	2.5	21	Swift Current, N. W. T	.54	16	Wichita, Kans Abilene, Tex	34 34	17 18	Bismarck, N. Dak	nw.	30	17
VII	19	29	98	36	79	2.0	29	Abilene, Tex	.34	18	Wilmington, N. C	32	20	Narragansett Pier, R. I	nw.	30	22
VIII	19	47	125	41	116	1.0	25	Qu'Appelle, N. W. T	.50	20	Cheyenne, Wyo	20	20	Helena, Mont	sw.	36	22
IX	25	52	97	29	87	3.0	28	White River, Ont	.64	25	White River, Ont	46	26	Kitty Hawk, N. C	n.	38	27
X	30	38	95	39	80	1.5	22	Port Huron, Mich	.36	30	Pueblo, Colo	24	28	Hatteras, N. C	n.	28	31
Mean						2.8	26		.46			32				36	
Low areas.									Fall.			Rise.					
I*	1	40	90	48	65	3.5	20	Knoxville, Tenn	.52	1	Lynchburgh, Va	26	2	Chicago, Ill	nw.	60	1
II	2	48	125	43	87	2.0	45	Saint Vincent, Minn	.56	3	Fort Buford, N. Dak	38	3	Fort Canby, Wash	s.	48	2
III	5	33	93	48	68	2.0	39	Boston, Mass Chatham, N. B	.50 .50	6 7	Montgomery, Ala	24	5	Block Island, R. I	e.	60	6
IV	6	52	103	48	83	2.0	23	Medicine Hat, N. W. T	.54	6	White River, Ont	28	8	Buffalo, N. Y	sw.	48	8
V	7	33	102	28	92	1.5	17	Galveston, Tex	.18	8	Pensacola, Fla	27	9	Abilene, Tex	s.	42	7
VI	12	29	90	49	67	2.5	32	New York, N. Y	.32	13	Wilmington, N. C Washington, D. C	24 24	12 14	Pensacola, Fla	s.	38	12
VII	15	49	125	50	68	2.5	46	Prince Arthur, Ont	.56	16	Rapid City, S. Dak Sault de Ste. Marie, Mich	34 34	16 17	Fort Canby, Wash	s.	38	15
VIII	18	53	115	47	77	2.5	29	Qu'Appelle, N. W. T	.92	19	White River, Ont	62	20	Huron, S. Dak	sw.	55	19
IX	20	51	113	47	66	2.5	39	do	.70	21	do	58	22	Fort Assinaboine, Mont	sw.	48	21
X	22	53	113	45	67	4.5	22	White River, Ont	.46	23	do	44	24	Woods Holl, Mass	nw.	56	27
XI	26	47	125	42	65	5.0	28	Duluth, Minn	.48	27	do	38	27	Fort Canby, Wash	se.	69	25
XII	29	49	127	48	88	2.0	37	Calgary, N. W. T	.68	29	do	36	31	do	s.	61	29
XIII	30	37	118	40	98	1.0	42	Pueblo, Colo	.26	31	Wichita, Kans	16	31	Tucson, Ariz	w.	40	30
														Amarillo, Tex	s.	40	31
Mean						2.6	32		.51			35				51	

*Continuation of low area XIVa for December, 1891.

NORTH ATLANTIC STORMS FOR JANUARY, 1892 (pressure in inches and millimeters; wind-force by Beaufort scale).

The paths of storms that appeared over the west part of the north Atlantic Ocean during January, 1892, are shown on Chart I. These paths have been determined from reports of observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

In January there is usually an increase of pressure over the southern parts of the north Atlantic Ocean, the increase exceeding .05 in an area about midway between the Azores and Windward West Indies. Over the northern part of the ocean there is a decrease of pressure. The storms of this month generally advance over the ocean from the Canadian Maritime Provinces, and move thence in an east-northeast to northeast course toward the Iceland low area. The average number of storms that traverse the north Atlantic from coast to coast in January is 2.5, and in a majority of instances these storms skirt the southern quadrants of the Iceland low area and pass

over or north of the North Sea. The average velocity of north Atlantic storms in January is about 22 statute miles per hour.

The month opened with high pressure east of the 45th meridian and low pressure over Newfoundland and the Grand Banks. The pressure continued high over mid-ocean between the 45th and 55th parallels until the 13th, after which the high area settled southward to its usual position south of the 40th parallel. Over the British Isles the pressure continued high until the 4th; from the 4th to 24th the pressure continued low and unsettled weather prevailed over the eastern part of the ocean, which condition was followed by high pressure from the 25th to the close of the month. The pressure continued low between the 50th and 70th meridians until the 7th; from the 8th to 18th high pressure prevailed in that region; and from the 19th until the close of the month low pressure and unsettled weather obtained over and west of Newfoundland and the Grand Banks.

On the 1st a storm, with pressure about 29.70 (754) and east gales of force 10, was central south of Newfoundland, whence it passed southeastward to about the 40th parallel by the 2d, with an apparent increase of energy, and on the 3d and 4th was central west of the Azores. By the 5th this storm had apparently passed northwestward and united with low area I which had advanced south of Newfoundland. The high area over mid-ocean, above referred to, prevented the advance of this storm and finally forced it westward. During the 4th low area I moved from the Bay of Fundy to the west part of the Gulf of Saint Lawrence, and passed thence south of Newfoundland by the morning of the 5th, with pressure falling to about 29.30 (744) and gales of force 7 to 9. The influence of this storm was felt to the Bermudas on the 4th and 5th, where the wind veered from south to west and reached force 3 to 4. On the 6th this storm was central north of the Grand Banks, after which it disappeared north of the region of observation.

On the 5th a storm of considerable energy was central over the North Sea, and it was apparently central in that region on the 6th, with a heavy snowstorm in northern Scotland. On the 7th British pressure was reported lowest over Ireland, and heavy snow fell in parts of England and Ireland. On this date low area III passed north of the Gulf of Saint Lawrence, and a storm appeared central near the Azores. On the 8th a storm was central over the east part of the North Sea, and heavy snow and cold weather were reported over Great Britain. Snow and rain continued in England and Scotland on the 9th. The pressure continued low over the eastern part of the ocean, and on the 11th a storm was apparently central southwest of the Bay of Biscay, whence it probably moved eastward over the Spanish Peninsula by the 13th. On the 14th the pressure was low east of the 35th meridian, and on the following date the pressure fell to 29.10 (739) in Ireland.

On the 16th the pressure continued low over the eastern part of the ocean, the pressure was 29.20 (742) over Ireland, and a heavy gale was reported at Lisbon, Portugal. On the 17th the pressure was lowest west of the British Isles, in about W. 20°; on the 18th a trough of low pressure extended from the Spanish Peninsula to Iceland, and the pressure continued low in those regions until the 23d. On the morning of the 19th a storm appeared central near western Nova Scotia, whence it advanced north of the Grand Banks by the 20th, with a marked display of energy. The pressure continued low along the trans-Atlantic steamship routes west of the 50th meridian during the balance of the month under the influence of low areas IX, X, and XI. The eastward movement of these storms caused low pressure over mid-ocean until the 30th, while over the eastern part of the ocean high pressure prevailed from the 24th until the close of the month.

OCEAN ICE.

No Arctic ice was reported for January, 1892. In January, 1891, 3 large icebergs were observed in N. 46° 30′, W. 52° 46′ on the 28th, and on the 31st patches of soft ice were encountered in N. 45° 50′, W. 59° 20′. In 1890 vast fields of ice and enormous icebergs were reported over and near the Banks of Newfoundland north of the 43d parallel. In 1889 no ice was reported. In January, 1882 to 1888, inclusive, Arctic ice in small quantities was reported east of Newfoundland, but in no case was it sighted south of the 43d parallel.

OCEAN FOG.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on 17 dates; between the 55th and 65th meridians on 10 dates; and west of the 65th meridian on 2 dates. Compared with the corresponding month of the last 4 years the dates of occurrence of fog east of the 55th meridian numbered 12 more than the average; between the 55th and 65th meridians 1 more than the average; and west of the 65th meridian 5 less than the average. The dense fog noted by shipmasters and reported at stations of the Weather Bureau along the New England, New York, and New Jersey coasts generally attended the advance or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for January, 1892, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over extreme southern Florida, where it was above 65; it was above 50 over the Florida Peninsula, along parts of the immediate Gulf coast, in the lower Colorado and lower Gila valleys, and on the immediate Pacific coast south of the 38th parallel; and was above 40 over the south parts of the south Atlantic and Gulf states, in extreme southern New Mexico, and west of a line traced from east-central Arizona over the west side of the Sierra Nevada Mountain range to northwestern California, and thence northward inside the coast line to Vancouver Island. The mean temperature was lowest in Manitoba and eastern Saskatchewan, where it was below —5; it was below zero at points on the north shore of Lake Superior, in northern Minnesota, and northeastern North Dakota; and was below 20 north of a line traced from southern New Brunswick irregularly south of west to the middle-eastern slope of the Rocky Mountains, thence to southeastern Montana, thence to extreme north-central New Mexico, and thence to western Montana. The mean temperature was also below 20 in an area which occupied the central part of the middle plateau region.

DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was above the normal along the Pacific coast, thence eastward over the northern part of the country to the Red River of the North and extreme upper Mississippi valleys, and thence southwestward over the southeast slope of the Rocky Mountains and the east part of the